

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 June 2004 (24.06.2004)

PCT

(10) International Publication Number
WO 2004/053088 A3

- (51) International Patent Classification⁷: C12P 21/02, C12N 1/00, 5/02, 15/63
- (21) International Application Number: PCT/US2003/038995
- (22) International Filing Date: 9 December 2003 (09.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/431,904 9 December 2002 (09.12.2002) US
- (71) Applicant (for all designated States except US): **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA** [US/US]; 1111 Franklin Street, 5th Floor, Oakland, CA 94607 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **HWA, Terence, Tai-Li** [US/US]; 410 Pearl St., #3D, La Jolla, CA 92037 (US). **GERLAND, Ulrich** [DE/DE]; Philipp-Foltz Strasse 8, 81737 Muenchen, Germany (DE). **BUCHLER, Nicolas** [US/US]; 500 East 63rd Street, Apt. 22F, New York, NY 10021 (US).
- (74) Agents: **MUSICK, Eleanor, M. et al.**; Kilpatrick Stockton LLP, Suite 2800, 1100 Peachtree Street, Atlanta, GA 30309-4530 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report
- (88) Date of publication of the international search report: 26 May 2005
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: GENETIC COMPUTING USING COMBINATORIAL TRANSCRIPTION CONTROL

(57) Abstract: A scheme is provided for selecting the regulatory DNA sequences to exert combinatorial control of gene transcription in vivo by multiple regulatory proteins, i.e., transcription factors (TFs). The method provides the ability to implement a wide range of complex logic functions through the manipulation of the regulatory DNA sequences, typically several hundred bases in length. The method includes procedures for selecting the strengths of the binding sites of different TFs and their relative positioning in order to implement a plurality of different logic functions.

WO 2004/053088 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/38995

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : C12P 21/02; C12N 1/00, 5/02, 15/63 US CL : 435/69.1, 375, 455 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 435/69.1, 375, 455 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Continuation Sheet		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,814,618 (BUJARD ET AL) 29 September 1998 (29.09.1998), see entire document.	1-7, 11-17, 21-24

Y		8-10, 18-20
Y	WO 94/12015 (CHUA ET AL) 09 June 1994 (09.06.1994), see entire document.	8-10, 18-20
Y	US 5,968,773 (HEDDLE ET AL) 19 October 1999 (19.10.1999), see entire document.	8-10, 18-20
Y	US 5,834,236 (LAMB ET AL) 10 November 1998 (10.11.1998), see entire document.	8-10, 18-20
Y	US 5,942,433 (VINSON ET AL) 24 August 1999 (24.08.1999), see entire document.	8-10, 18-20
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search 22 February 2005 (22.02.2005)		Date of mailing of the international search report 11 MAR 2005
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer <i>Jamulal Shabana</i> Terry A. McKelvey Telephone No. 703-308-0196

INTERNATIONAL SEARCH REPORT

PCT/US03/38995

Continuation of B. FIELDS SEARCHED Item 3:

EAST (USPAT, PGPUB, EPO, JPO, Derwent databases), Dialog OneSearch (biotech databases)

search terms: operator sequence, cis, element?, regulat?, silencer?, enhancer?, genetic, comput?, overlap?, artificial, engineer?, chimex?,
and, or, nand, xor, gate?, logic, function?, dna binding